DR. L. A. BAUER has been appointed assistant professor of mathematics and mathematical physics at the University of Cincinnati. He will not enter on his new duties before September.

DR. R. W. T. GÜNTHER has been elected fellow of Magdalen College, Oxford, and tutor of natural science.

DISCUSSION AND CORRESPONDENCE.

COMPLIMENT OR PLAGIARISM.

WE have no occasion to withdraw any of our previous statements by reason of Professor Halsted's second communication.

We still maintain that "the same order may be found in Newcomb's Elements of Geometry." After proving that *by dividing the arc we divide the angle* and, conversely, *by dividing the angle we divide the arc*, Newcomb gives the following problems, which we compare with Halsted's:

NEWCOMB.	HALSTED.
PROBLEM I. *To divide a given circle into* 2, 4, 8, 16, *etc., equal parts.*	PROBLEM I. *To bisect a perigon.*
PROBLEM II. *To divide the circle into* 3, 6, 12, 24, *etc., equal parts.*	PROBLEM II. *To trisect a perigon.*
PROBLEM III. *To divide a circle into* 5, 10, 20, *etc., equal parts.*	PROBLEM III. *To cut a perigon into five equal parts.*
PROBLEM IV. *To divide a circle into fifteen, etc., equal parts.*	PROBLEM IV. *To cut a perigon into fifteen equal parts.*

Professor Halsted must think us very childish, indeed, if we assert that the word perigon is found in several geometries when the word is found in only Halsted's books and our own. He will find the word in Smith's Introductory Modern Geometry of Point, Ray and Circle, in Dupuis's Elementary Synthetic Geometry, in the later editions of Newcomb's Elements of Geometry, in Faifofer's Elementi di Geometria. But, perhaps, Professor Halsted will say, "All these books appeared after my Metrical Geometry in 1881, and these authors took the word from me." We have reason to believe that W. B. Smith, Newcomb and Faifofer all did see the word for the first time in Halsted's books.

The question then remains: "Where did Professor Halsted get it? Did he invent it, as he substantially asserts, or did he find it ready made?" This we cannot answer. We can only say we know where he might have found it.

In Sandeman's Pelicotetics, or the Science of Quantity, Cambridge [England], Deighton Bell and Co., 1868, which Professor Halsted might have seen in the Princeton University library, or in the Peabody Institute library at Baltimore, we read (page 304): "A PERIGON is the angle without any overlapping bounded by two straight lines lying in the same straight line upon the same side of their common end.

"A straight line being everywise alike upon all sides everywhere throughout is in any plane through it anglewise alike upon both sides at any point in it, and hence half a perigon or a HEMIPERIGON is the unoverlapping angle bounded by two straight lines lying in the same straight line upon opposite sides of their common end. A right angle is both one-half of a hemiperigon or a HEMISEMIPERIGON and one-fourth of a perigon."

That this same book was in the hands of Instructor Lefevre of the University of Texas, when he wrote his Number and its Algebra is fairly obvious from the following extract:

PELICOTETICS.	NUMBER AND ITS ALGEBRA.
"Driven to the * * * outrageously overtowering extravagance and absurdity of finding and raising high as a principle that a chain of reasoning to be strong and good need not have meaning in every link; that, in other words, the conclusiveness of an argument has nothing to do with the intelligibility of its several steps, or that things may be thoroughly made out true for reasons nowise to be understood."	"Accept the outrageous extravagance that a concatenation of deductions to be valid need not have meaning in every link; that a compulsory conclusion of an argument does not require intelligibility of its several steps; or that results may be thoroughly made out true for reasons nowise understood."

To us it seems well-nigh incredible that the man who made the important discovery in 1879 "that Princeton possesses * * * the identical volume from which the first translation of Euclid into English was made by Sir Henry Billingsley," and who, in 1896, "for four months * * * was buried in the uttermost parts of Hungary, Russia and Siberia," where he "made many important finds," could have failed to discover such an excellent word as 'perigon' in a book almost daily before his eyes.

BEMAN AND SMITH.

PROFESSOR JASTROW'S TEST ON DIVERSITY OF OPINION.

A DIVERSITY of answers is possible to Professor Jastrow's case of reasoning without being false in any one of them. Answers may de-

pend upon different assumptions regarding different parts of the argument.

Without going to the syllogistic part of the argument, it can be said at the outset that it is impossible to prove that B is A if A is B. Such a conclusion would violate the law of Conversion, unless the proposition A is B is a definition or exclusive. In the latter two alternatives it could be proved by the law of conversion. But Professor Jastrow gives an attempt to prove it syllogistically, that is, by *mediate* instead of *immediate* reasoning. As it is stated mediate reasoning is not applicable, because no middle term is given. Moreover, even immediate inference can do nothing until we know what kind of a proposition A is B is supposed to be. If it is the ordinary universal we cannot prove that B is A, for the reason mentioned. If it is a particular affirmative, a definition, or an exclusive proposition, it can be proved that B is A by immediate inference, and the error in the argument would be that it is an attempt at syllogistic or mediate reasoning where there is no middle term and where the attempt to supply it may be a *petitio principii.*

But, taking the syllogistic argument as it is given, it is intended as a case of prosyllogism and episyllogism connected with the disjunction that B is either A or not A. It is supposed, therefore, that the absurdity of the conclusion in the prosyllogism justifies the conclusion in the episyllogism, because that absurdity is assumed to show the absurdity of the first term of the disjunction, and hence the second would follow. But we must raise the question first whether the reasoning is formal or material.

In the prosyllogism the formal reasoning is perfectly correct. It is a case either of $E\ A\ E$ of the First Figure or $A\ E\ E$ of the Fourth Figure and is formally correct in either case. That is to say, with the premises given, the conclusion A is not A *does* follow, and there is no right to call it absurd, as Professor Jastrow does. It is an illustration of the fact that we must either impeach the premise or accept the conclusion. We cannot accept the premises and deny this conclusion at the same time. Hence, we may say either that one of the premises is a *petitio principii*, or the statement 'which is absurd' is a *petitio principii.*

There is only one way to establish a formal fallacy in this syllogism, and it is to assume that the major premises (major if the First Figure and minor if the Fourth Figure) is O, a particular negative. This will give $O\ A\ O$ of the First Figure, or $A\ O\ O$ of the Fourth Figure, in both a case of undistributed middle. But then, so far from making the conclusion absurd, as assumed here, it cannot be drawn at all. No conclusion whatever can be drawn under such conditions. Hence, if the propositions that A is not A be considered absurd it must be on other grounds than the formal reasoning, whether correct or incorrect. In fact, it is a manifest contradiction, but is not so because of the reasoning, but because the premise B is not A contradicts A is B. Technically it is the contradictory of the converse of A is B, and this makes the second premise a *contradictio in adjecto* of the first and, therefore, a *petitio principii*, a *material* fallacy.

Again, granting, on any grounds, that the conclusion of the prosyllogism is absurd, it is a *non sequitur* to infer from this fact that B is A, a *material* fallacy also. The temptation to accept it comes from the reflex influence of the assumed absurdity of the conclusion in the prosyllogism A is not A, upon the absurdity of the premise B is not A, the proposition that A is B not being questioned. But this only throws us back to a disjunctive syllogism as the only proper one in the case from which to attempt to draw the conclusion B is A, and thus nullifies the whole syllogistic procedure in the prosyllogism, as an *ignoratio elenchi.* The argument should proceed disjunctively, with the proposition B is not A as the minor premise of a disjunctive syllogism, and it would appear as follows:

B is either A or not A.
B is not A
$\therefore B$ is A.

But in this reasoning we have a violation of the principle in disjunctive reasoning; namely, the *modus tollendo ponens.* If we deny one term we must affirm the other. We deny the first term in the minor premise, and, as the second term is 'not A' (instead of A), when we affirm it, the conclusion must be B is not A, the same

as the minor premise, of course. But B is A is a *non sequitur*, both a formal and a material fallacy in the case. In fact, the instance is simply the common one for puzzling school boys.

It either rains or it does not rain.
It rains
∴ It does not rain.

The illusion is created by the failure to see that the principle of disjunction is not fulfilled by merely using the word 'not' before rains in the conclusion, when an additional negative is required by the dictum of this form of reasoning. The 'not' in this case is a part of the second term in the disjunction 'not rains,' and hence, when we follow the law of disjunctive inference, we should get 'It does not not rain,' or by double negatives 'It rains,' which is the true conclusion. So in Professor Jastrow's case. The *modus tollendo ponens* requires us to affirm the second term, which is 'not A,' and we get as the true conclusion B is not A, instead of B is A, which is a *nonsequitur*, as indicated.

But now, that I find that the conclusion is the same as the minor premise in the disjunctive reasoning, I may raise the further question whether there is not another material fallacy somewhere, since disjunctively I might get B is not A. In the instance before us this can be done, and in disjunctive inference the only fallacy that is most likely to occur is the *petitio principii*. The *non sequitur* will occur only when there is also a formal fallacy in it. Now, after assuming that A is B, it violates conversion to suppose that B is A, and it is a contradiction to suppose that B is not A. Hence with A is B as our premise, and B is either A or not A as the other; we have a *petitio principii* in the latter case. We might say that the disjunction is incomplete, which is possible if we assume that A is B, and which would only result in making the third alternative a particular proposition, I or O, with the formal fallacy mentioned in the prosyllogism, a *petitio principii* in the disjunctive syllogism, and a *non sequitur* in supposing that B is A.

JAMES H. HYSLOP.
COLUMBIA UNIVERSITY,
NEW YORK, January 15, 1897.

SCIENTIFIC LITERATURE.

Higher Mathematics. A text-book for classical and engineering colleges. Edited by MANSFIELD MERRIMAN, Professor of Civil Engineering in Lehigh University, and ROBERT S. WOODWARD, Professor of Mechanics in Columbia University. New York, John Wiley & Sons. 1896. 8vo. Pp. xi+576.

The appearance of this rather unique volume is significant as a proof of the rapid development of mathematical instruction in this country. It is designed for undergraduates who have mastered the elements of the differential and integral calculus. After referring to the danger of excessive specialization and to the desirability of guiding the student to 'a comprehensive view of the mathematics of the present day,' the preface sets forth the general scope of this work in the following passage, which, for several reasons, is worth quoting in full: "During the past twenty years a marked change of opinion has occurred as to the aims and methods of mathematical instruction. The old ideas that mathematical studies should be pursued to discipline the mind, and that such studies were ended when an elementary course in the calculus had been covered, have for the most part disappeared. In our best classical and engineering colleges the elementary course in calculus is now given in the sophomore year, while lectures and seminary work in pure mathematics are continued during the junior and senior years. It is with the hope of meeting the existing demand for a suitable text to be used in such upper-class work that the editors enlisted the cooperation of the authors in the task of bringing together the chapters of the book." The following synopsis of the chapters will give some idea of the contents of 'Higher Mathematics:' I. 'The solution of equations,' by Mansfield Merriman (32 pp.); II. 'Determinants,' by Læenas Gifford Weld (37 pp.); III. 'Projective geometry,' by George Bruce Halsted (37 pp.); IV. 'Hyperbolic functions,' by James McMahon (62 pp.); V. 'Harmonic functions,' by William E. Byerly (57 pp.); VI. 'Functions of a complex variable,' by Thomas S. Fiske (77 pp.); VII. 'Differential equations,' by W. Woolsey Johnson (71 pp.); VIII. 'Grassmann's space analysis,' by Edward W.